

Advanced Nanocomposite Membrane, Phase I

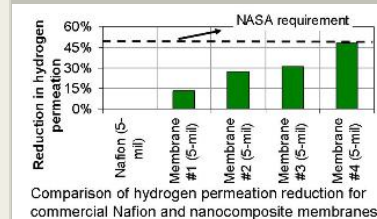
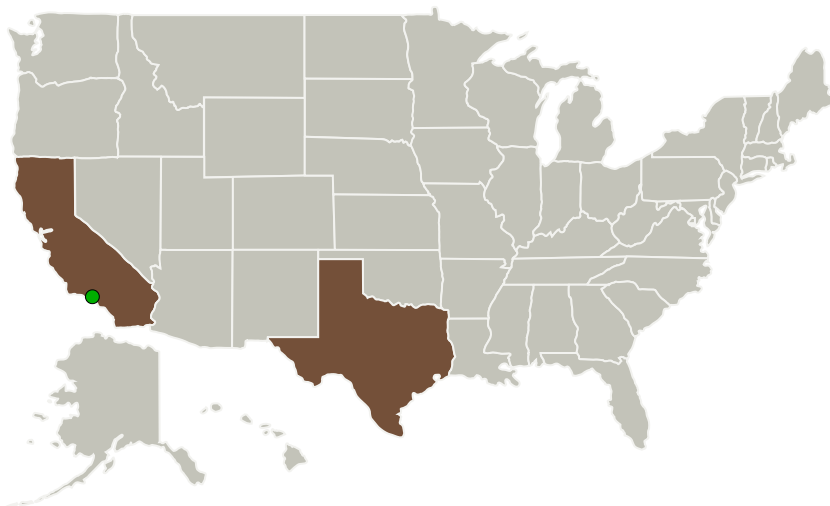
Completed Technology Project (2013 - 2013)



Project Introduction

With the increasing demands placed on extravehicular activities (EVA) for International Space Station (ISS) maintenance, there is a critical need for oxygen delivery for EVA's from on-station sources. Since mechanical compressors have significant lifetime issues, NASA is evaluating high pressure PEM electrolyzer technology to generate and compress oxygen on the ISS. State-of-the-art electrolyzers use Nafion® and similar perfluorosulfonic acid membranes which have significant hydrogen (H₂) permeation issues. To achieve the efficiencies desired, NASA requires a 50% or more reduction in H₂ permeation with less than 10% reduction in ionic conductivity. Lynntech proposes to manufacture nanocomposite membranes with significantly reduced H₂ permeation while maintaining high ionic conductivity. Preliminary results showed an unprecedented reduction in H₂ permeation with minimal reduction in ionic conductivity (which have not been demonstrated before), no acid generation, and increased water transfer capability. In Phase I, Lynntech will further optimize the membrane microstructure to achieve a target 60 to 70% reduction in H₂ permeation with less than 10% reduction in ionic conductivity. The anticipated Technology Readiness Level at the beginning and ending of Phase II will be 3 and 4, respectively.

Primary U.S. Work Locations and Key Partners



Advanced Nanocomposite Membrane

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Organizations Performing Work	Role	Type	Location
Lynntech, Inc.	Lead Organization	Industry	College Station, Texas
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Texas

Project Transitions

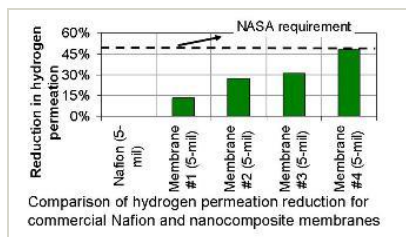
▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137964>)

Images



Project Image

Advanced Nanocomposite Membrane

(<https://techport.nasa.gov/image/128099>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Lynntech, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

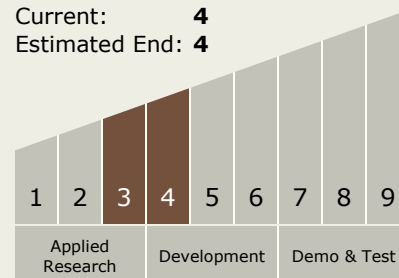
Alan Cisar

Technology Maturity (TRL)

Start: 3

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.2 Energy Storage
 - └ TX03.2.2 Electrochemical: Fuel Cells

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System